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"Challenges are what make life interesting and overcoming them is what makes life meaningful."
-Joshua J. Marine

HW: "Reflecting Parabolas" Homework section

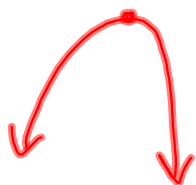
AIM: How do we recognize reflections of Parabolas?

Warm Up:

1) What is the vertex of the equation $f(x) = \textcircled{-}(x+3)^2 - 32$?

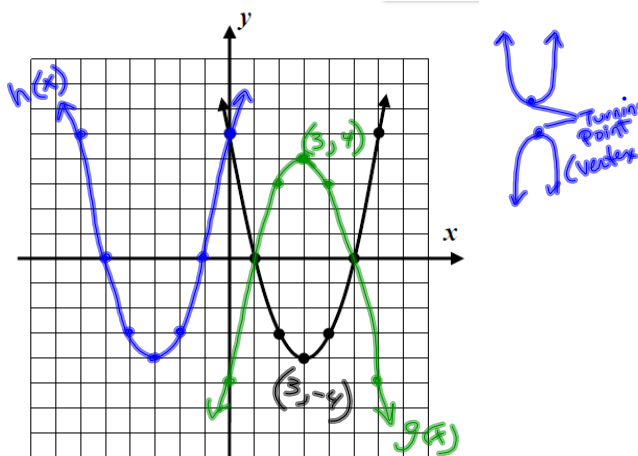
Vertex Form:

Parabola



Vertex: $(-3, -32)$

Exercise #1: The parabola $f(x) = x^2 - 6x + 5$ is shown on the grid below.



- (a) Consider the function $g(x) = -f(x)$. Determine a formula for $g(x)$ and graph it on the grid below.

$$g(x) = -(x^2 - 6x + 5)$$

$$g(x) = -x^2 + 6x - 5$$

- (b) How was the graph of f transformed to produce the graph of g ?

Reflection over the x-axis
(x-values stay same and y-values switch sign)

- (c) Now consider the function $h(x) = f(-x)$.

Determine a formula for $h(x)$ and graph it on the grid above.

$$h(x) = (-x)^2 - 6(-x) + 5$$

$$h(x) = x^2 + 6x + 5$$

- (d) How was the graph of f transformed to produce the graph of h ?

Reflection over the y-axis
(x-values change signs y-values remain the same)

REFLECTING FUNCTIONS IN THE X AND Y AXES

^{outside}
The function $-f(x)$ is a reflection of $f(x)$ in the x-axis. (y-values change)

^{inside}
The function $f(-x)$ is a reflection of $f(x)$ in the y-axis. (x-values change)

Exercise #2: Determine an equation for the linear function $g(x) = 5x - 7$ both after a reflection in the x-axis and y-axis. Label your equations.

Reflect over x-axis
(outside)

$$y = -(5x - 7)$$

$$y = -5x + 7$$

Reflect over y-axis:
(Inside)

$$a(x) = 5(-x) - 7$$

$$a(x) = -5x - 7$$

Exercise #3: If a parabola has the equation $f(x) = 2x^2 - 3x + 8$, which of the following represents its equation after a reflection in the x-axis? (Outside y-changes)

(1) $y = 2x^2 + 3x + 8$

(3) $y = -2x^2 + 3x + 8$

(2) $y = -2x^2 + 3x - 8$

(4) $y = 2x^2 - 3x - 8$

$$-(2x^2 - 3x + 8)$$

$$-2x^2 + 3x - 8$$

(Inside = x-value changes)

Exercise #4: After a reflection in the y-axis, the quadratic function $g(x) = 4x^2 - 7x + 2$ would have the equation

(1) $y = -4x^2 + 7x + 2$

(3) $y = 4x^2 + 7x + 2$

(2) $y = -4x^2 + 7x - 2$

(4) $y = 4x^2 + 7x - 2$

$$4(-x)^2 - 7(-x) + 2$$

$$4x^2 + 7x + 2$$

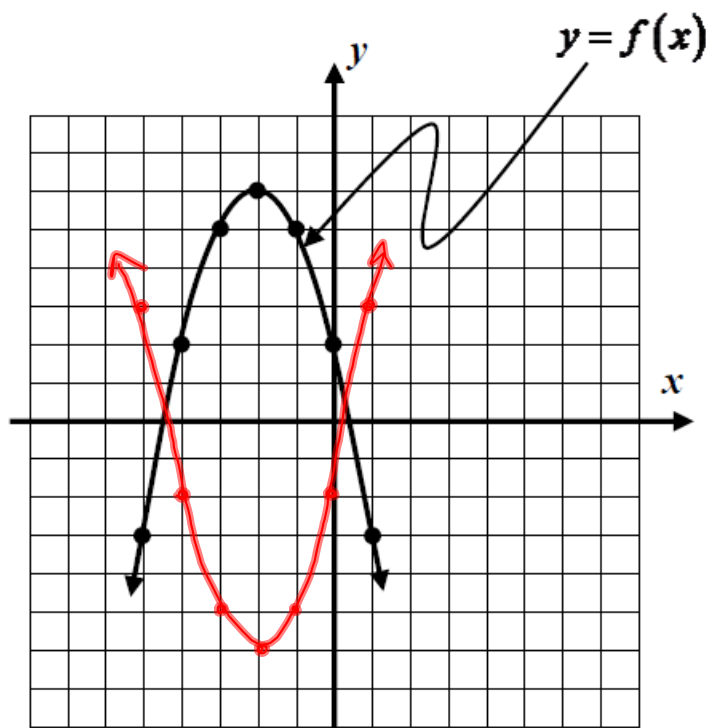
Exercise #5: Consider the function $g(x) = -x^2 + 4$. What two transformations have occurred to the graph of $y = x^2$ to produce the graph of g ? Specify the transformations and the order in which they occurred. Note that there exists more than one correct answer. Graph on your calculator to verify.

① Reflect over x-axis
② up 4

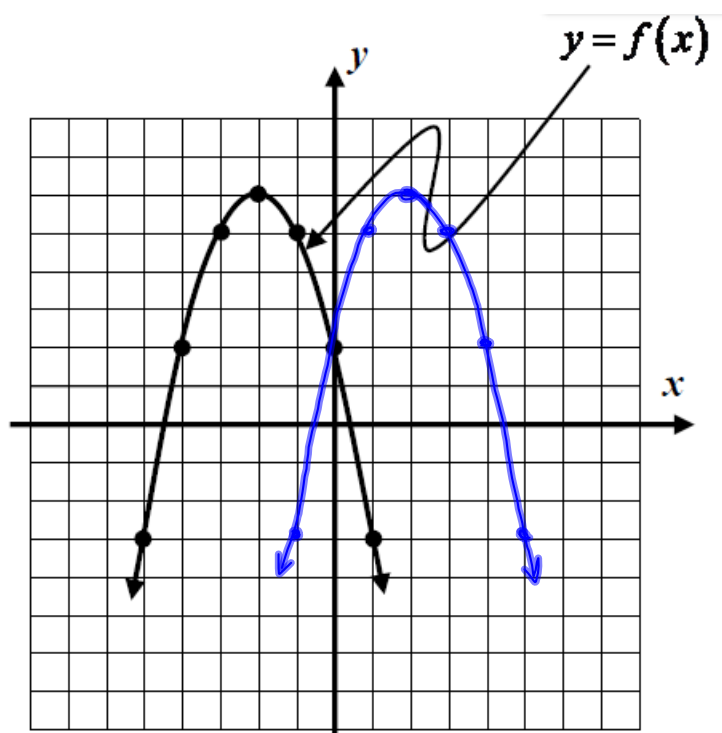
$$\frac{-y}{-1} = \frac{5x - 7}{-1}$$

$$y = -5x + 7$$

Exercise #6: The graph of a function $f(x)$ is shown below on two grids. Sketch (a) the graph of $-f(x)$ and (b) the graph of $f(-x)$.



(a) Graph and label $-f(x)$.



(b) Graph and label $f(-x)$